

REMARKS

The Notice of Panel Decision from Pre-Appeal Brief Review dated April 22, 2009 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1, 2, 16, 17, 31, 32, 46, 50 and 51 have been amended to more particularly point out and distinctly claim the subject matter of the invention. No new matter has been added. Claims 1-4, 6-19, 21-34 and 36-51 are presently pending and are respectfully submitted for reconsideration.

Claims 1-4, 6-19, 21-34 and 36-51 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ketchum et al. (U.S. Patent No. 6,138,026) in view of Kuchi (U.S. Patent Publication No. 2002/0126648). The Office Action took the position that Ketchum discloses all of the claim recitations except for a communication channel that uses a non-orthogonal modulation matrix. The Office Action then relied on Kuchi to cure those deficiencies of Ketchum with respect to the claims. Applicants submit that the combination of Ketchum and Kuchi fails to disclose or suggest all of the features recited in the pending claims.

Claim 1, upon which claims 2-4, 6-15 and 47 are dependent, recites a method that includes determining a performance measure representing communication performance in a communication channel between a first transceiver and a second transceiver in a telecommunication system. The method uses an extended channel model which depends on a non-orthogonal modulation matrix. Non-orthogonal modulation is used by the non-

orthogonal modulation matrix. The modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, and the performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal matrix. The method also provides controlling the communication resources based on the performance measure.

Claim 16, upon which claims 17-19, 21-30 and 48 are dependent, recites an apparatus that includes a determiner configured to determine a performance measure representing communication performance in a communication channel between a first transceiver and a second transceiver in a telecommunications system by using an extended channel model which depends on a non-orthogonal modulation matrix. The non-orthogonal modulation by the non-orthogonal modulation matrix is composed in the extended channel model. The modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, and the performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal modulation matrix. The apparatus also includes a controller configured to control the communication resources based on the performance measure.

Claim 31, upon which claims 32-34, 36-45 and 49 are dependent, recites an apparatus that includes a performance measure estimator configured to determine a performance measure that represents performance in a communication channel between a

first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The non-orthogonal modulation by the non-orthogonal modulation matrix is comprised in the extended channel model. The modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, and the performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal modulation matrix. The apparatus also includes a controller connected to the performance measure estimator, the controller being configured to control the communication resources based on the performance measure.

Claim 46 recites an apparatus that includes means for determining a performance measure representing communication performance in a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The non-orthogonal modulation by the non-orthogonal modulation matrix is comprised in the extended channel model. The modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns. The performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal modulation matrix. The apparatus also comprises means for controlling the communication resources based on the performance measure.

Claim 50 recites an apparatus that includes a performance measure estimator configured to determine a performance measure that represents communication

performance in a communication channel between a base station and a mobile station by using an extended channel model which depends on a non-orthogonal modulation matrix. The non-orthogonal modulation by the non-orthogonal modulation matrix is comprised in the extended channel model. The modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns and the performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal modulation matrix. The apparatus also includes a radio frequency part configured to transmit the determined performance measure to the base station for controlling communication resources.

Claim 51 recites an apparatus that includes a controller configured to receive a performance measure that represents communication performance in a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The non-orthogonal modulation by the non-orthogonal modulation matrix is comprised in the extended channel model. Modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns. The performance measure is sensitive to a change in spatial modulation through the extended channel model. The spatial modulation is used by the non-orthogonal modulation matrix. The apparatus is also configured to control communication resources based on the received performance measure.

As will be discussed below, the teachings of Ketchum and Kuchi fail to disclose all of the elements of the claims, and therefore fails to provide the features discussed above. The rejection is respectfully traversed for at least the following reasons.

Ketchum discloses selecting a transmit modulation scheme based on the channel state information (CSI) received from a receiver. As previously submitted, the effect of modulation is removed from the received signal before the CSI is calculated (please see FIG. 5 of Ketchum). Even in the case where the CSI is representative of the full channel model, including channel coefficients, the effect of the modulation is not in the channel model itself.

Claim 1 recites that “the non-orthogonal modulation matrix is comprised in the extended channel model, wherein modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, the performance measure being sensitive to a change in spatial modulation through the extended channel model, the spatial modulation being used by the non-orthogonal modulation matrix.” Similar features are recited in independent claims 16, 31, 46, 50 and 51. As may be observed from the above-noted claim recitations, the spatial modulation is included in the channel model when determining the communication performance in the current communication channel.

Ketchum does not include the modulation when it determines the CSI. Instead, Ketchum determines the modulation scheme to be used on the basis of the CSI after the CSI has been determined. This operation of determining the modulation scheme on the basis of

the CSI, as disclosed in Ketchum, corresponds most closely to the claim recitation of “a controller configured to control the communication resources”, as recited in claim 1, and, not to the claim recitation of “the non-orthogonal modulation matrix is comprised in the extended channel model, wherein modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, the performance measure being sensitive to a change in spatial modulation through the extended channel model, the spatial modulation being used by the non-orthogonal modulation matrix”, as recited in independent claim 1 and similarly independent claims 16, 31, 46, 50 and 51.

The CSI of Ketchum is representative of the communication channel itself. In contrast to the disclosure of Ketchum, the “performance measure” of the claim recitations is based on a combination of the communication channel and the spatial modulation (i.e. the modulation included in the channel model). This being the case, the configuration of Ketchum results in a fundamental difference from the subject matter recited in the pending claims. For example, the system of Ketchum cannot evaluate the actual performance of different modulation schemes in the current communication channel. In Ketchum, the selection of a modulation scheme would rely on a predetermined mapping of different CSIs to their respective modulation schemes. Therefore, real-time evaluation of the performance of different modulation schemes in the current communication channel of Ketchum is not possible. As a result, the configuration offered by Ketchum would result in suboptimal selection of a modulation scheme in various communication channels.

Conversely, the “performance measure” recited in the claims includes the modulation in the channel model, and, thus, can be use to determine the actual performance of different modulation schemes in the current communication channel in real-time unlike Ketchum. Therefore Ketchum cannot disclose or suggest the claimed feature of “the non-orthogonal modulation matrix is comprised in the extended channel model, wherein modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, the performance measure being sensitive to a change in spatial modulation through the extended channel model, the spatial modulation being used by the non-orthogonal modulation matrix”, as recited in independent claim 1 and similarly in independent claims 16, 31, 46, 50 and 51. Ketchum simply fails to disclose that the performance measure is sensitive to a change in the spatial modulation through the extended channel model.

Since the system of Ketchum does not include the modulation (or any other transmission parameter) in the calculation of the performance measure (CSI), it calculates only one CSI on the basis of which the modulation scheme is selected. Ketchum cannot analyze the performance of different transmission schemes in the current communication channel, because it does not include the modulation in the estimation of the CSI. As a consequence, Ketchum is silent about comparison between different CSIs and selecting the transmission parameters related to the CSI yielding a better performance of communication.

In addition to the above-noted deficiencies of Ketchum, Kuchi further fails to cure the deficiencies of Ketchum with respect to the pending claims. Kuchi discloses using a

transmit diversity system that includes a base station 104 and a receiver 108 (see FIG. 1 of Kuchi). A stream of complex symbols is allocated to the transmitting device, which includes signal replications, such as, a complex conjugate and a negative complex conjugate of the signal symbols. A parallel transmission is temporally divided into time symbol periods. The transmitting devices of the transmit diversity system may transmit the complex symbol signals in parallel.

Kuchi further discloses using a non-orthogonal modulation with a non-orthogonal modulation matrix to perform the transmissions, however, Kuchi fails to disclose or suggest “the non-orthogonal modulation matrix is comprised in the extended channel model, wherein modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, the performance measure being sensitive to a change in spatial modulation through the extended channel model, the spatial modulation being used by the non-orthogonal modulation matrix”, as recited in independent claim 1 and similarly in independent claims 16, 31, 46, 50 and 51.

Accordingly, Ketchum does not disclose or suggest the above-noted feature of the performance measure being sensitive to the modulation. Furthermore, this feature is not obvious from the disclosure of Kuchi or from any other reference, because none of the references provide any disclosure or suggestion that the transmission modulation could be determined by the performance of the modulation in that channel. Kuchi only discloses a non-orthogonal modulation by a non-orthogonal modulation matrix, and

provides no disclosure for the dependence of the performance measure of the communication channel being sensitive to a change in the spatial modulation.

Therefore, Applicants submit that Ketchum and Kuchi fail to teach or suggest all of the subject matter of independent claims 1, 16, 31, 46, 50 and 51. By virtue of dependency, Ketchum and Kuchi also fail to teach the subject matter of those claims dependent thereon. Withdrawal of the rejection of claims 1-4, 6-19, 21-34 and 36-51 is kindly requested.

Claims 3, 18 and 33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ketchum in view of Kuchi and further in view of Cheng et al. (U.S. Patent No. 6,411,817). This rejection is respectfully traversed for at least the following reasons.

Ketchum and Kuchi are discussed above. Cheng discloses a method for controlling downlink power in a time-division multiplex wireless system. The method may provide different downlink transmit signal powers to different time-division multiplex channels of a single carrier. A base station receives a measured signal parameter data for a downlink transmit signal of a time-division multiplex channel. The base station determines an initial adjustment for the downlink transmit signal power of the time division multiplex channel if the measured signal parameter data differs from a target signal parameter data. The base station determines a revised adjustment for the downlink transmit power of the time division multiplex channel based on the initial adjustment and at least one adjustment range as appropriate to achieve synchronization of the demodulation of the downlink transmit signal.

Claims 3, 18 and 44 are dependent upon claims 1, 16 and 31, respectively, and contain all of the limitations thereof. As discussed above, Ketchum and Kuchi fail to disclose or suggest all of the elements of claims 1, 16 and 31. In addition, Cheng fails to cure the deficiencies in Ketchum and Kuchi as Cheng also fails to disclose or suggest “the non-orthogonal modulation matrix is comprised in the extended channel model, wherein modulation symbols in the non-orthogonal modulation matrix are distributed using at least two radiation patterns, the performance measure being sensitive to a change in spatial modulation through the extended channel model, the spatial modulation being used by the non-orthogonal modulation matrix” as recited in independent claim 1, and similarly in independent claims 16, 31 and 46.” Thus, the combination of Ketchum and Kuchi and Cheng fails to disclose or suggest all of the elements of claim 3, 18 and 44. Furthermore, claim 3, 18 and 44 should be allowed for at least their dependence upon claims 1, 16 and 31 and for the specific limitations recited therein.

For at least the reasons discussed above, Applicants respectfully submit that the cited references fail to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-4, 6-19, 21-34 and 36-51 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by

telephone, the applicant undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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